Welcome!

Supporting Instructional Coaching Cycles with NSTA Coaching Tools

NSTA National Conference on Science Education
Denver, Colorado
Friday, March 22, 2024, 1:20 pm - 2:20 pm
Introductions

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NSTA Standards Implementation Specialist
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### Denver24: Supporting Instructional Coaching Cycles with NSTA Coaching Tools Collection

**NSTA National Conference on Science Education, Denver, Colorado, March 2024**

- Earth & Space Science
- Engineering
- Life Science
- Physical Science

#### Resources in “Denver24: Supporting Instructional Coaching Cycles with NSTA Coaching Tools” Collection

<table>
<thead>
<tr>
<th>Title</th>
<th>Resource Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Framework for K-12 Science Education (pdf)</td>
<td>Web Page</td>
</tr>
<tr>
<td>A New Vision for Science Education</td>
<td>Web Page</td>
</tr>
</tbody>
</table>

[https://my.nsta.org/collection/jKmAvcqu1nA_E](https://my.nsta.org/collection/jKmAvcqu1nA_E)
Session Description

NSTA’s suite of instructional coaching tools support teachers, coaches and leaders in making the best use of instructional coaching cycles to support students’ sensemaking in the classroom. Become familiar with all of our OER coaching tools and try a few out a few in this session!

Please work toward creating groups of three to six at the tables OR be open to temporarily relocating for some of the activities in this session.
A Framework for K-12 Science Education

The framework is designed to help realize a vision for education in the sciences and engineering in which students, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields.

The learning experiences provided for students should engage students with their own fundamental questions about the world and with how scientists have investigated and found answers to those questions.
Continuum of Science Instruction

Information Frame
- Teacher is focused on disseminating information.
- Students are focused on knowing information.
- Science is portrayed as a body of established facts.
- Assessments are focused on “right” answers.

Knowing about...

Sensemaking Frame
- Teacher is focused on developing conceptual understanding.
- Students are focused on understanding something.
- Science is portrayed as a way to make sense of something.
- Assessments are focused on use of evidence to support conclusions/generalizations.

Figuring out...
Continuum of Science Instruction

Information Frame
• Teacher is focused on disseminating information.
• Students are focused on knowing information.
• Science is portrayed as a body of established facts.
• Assessments are focused on “right” answers.

Knowing about...

Sensemaking Frame
• Teacher is focused on developing conceptual understanding.
• Students are focused on answering their question(s) about a phenomenon.
• Science is portrayed as a way to collaboratively make sense of something using the three dimensions.
• Assessments are focused on use of evidence to support conclusions/generalizations.

Figuring out…
<table>
<thead>
<tr>
<th>Information Frame</th>
<th>Sensemaking Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Teacher is focused on</td>
<td>• Teacher is focused on</td>
</tr>
<tr>
<td>disseminating information.</td>
<td>developing conceptual</td>
</tr>
<tr>
<td></td>
<td>understanding.</td>
</tr>
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</table>

**Less Like**

- body of established facts.
- Assessments are focused on “right” answers.

**Knowing about..**

**More Like**

- Science is portrayed as a way to **collaboratively** make sense of something **using the three dimensions**.
- Assessments are focused on use of evidence to support conclusions/generalizations.

**Figuring out...**
NSTA Instructional Coaching Tools

GOAL SETTING PROTOCOL
Teacher:
Coach:
Date:

Tell me a little bit about your teaching practice.

What might be your personal strengths in terms of teaching three-dimensional science lessons?

What supports and resources might you have available to you already?

What might be some ways that you wish your lessons were different?

What might you need to learn more about?

What will it look/sound/feel like when you have made this change?

SENSEMAKING
Pre-Observation Planning Protocol

What phenomenon are students trying to explain?

What are students making sense of?

DCI element(s) or part of an element: CCC element(s) or part of an element:

STUDENT WORK ANALYSIS PROTOCOL
Teacher:
Date:

I wrote the three-dimensional (3D) learning goals for students? (Less-screen performance expectation)

(|Engineering Practice element(s)| Disciplinary Core Idea element(s) | Crosscutting Concept element(s) |

| Will Work Data |

At what might be the strengths in student understanding?

How well does the student work address the misconception as it

What differences are there among the samples? In there

OBSERVATION PROTOCOL
Teacher Says | Students Do/Say | Engaging in Practice(s)/Discourse

LESSON REFLECTION PROTOCOL
Teacher:
Coach:
Date:

What were the learning goals for students today?

What was our focus for the lesson today?

I noticed... I wondered... What might we learn based on this evidence?

How were students engaged in the SEPs in order to make sense of the phenomenon?

How did they use the CCCs to make sense of the phenomenon?

How did they relate the DCI to the phenomenon?

Action Steps:
GOAL SETTING PROTOCOL

Teacher:
Coach:
Date:

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
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<tbody>
<tr>
<td>Tell me a little bit about your teaching practice.</td>
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Planning and Goal Setting

Enacting and Observation

Reflection and Feedback
Goal Setting Protocol

Small Groups - 1

Choose one person to be the teacher receiving instructional coaching (teacher).

*Teacher:* Think about a teacher you coach who is at point 1, 2, or 3 on the continuum of science instruction, and respond to the questions as that teacher might.

Remaining group members will be the instructional coach (coach).
Small Groups - 2

- Coach(es) use the **Goal Setting Protocol** to get to know the teacher.
  - *It is not necessary to ask the questions in order.*
  - *Note additional questions that naturally arise as you get to know this teacher.*
- Coach(es) individually determine where you think the teacher is along the science instructional continuum (1, 2, or 3). **Do not share yet with your group.**

Be ready to share what you listened for to help determine the teacher’s location on the continuum.
Goal Setting Protocol

Small Groups - 3

**Teacher and coach(es)** reveal your thinking of the teacher’s location on the science instruction continuum.

- **Teacher**: How were you signaling your location on the continuum in your responses?
- **Coaches**: What did you listen for in the teacher’s responses to determining their location on the continuum?
- **Small Group**: What might you focus on with this teacher first - phenomena, student ideas, or three dimensions?
## Sensemaking - Pre-Observation Planning

### Sensemaking Protocol

**Pre-Observation Planning Protocol**

<table>
<thead>
<tr>
<th>What phenomenon are students trying to explain?</th>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What are students making sense of?</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCI element(s) or part of an element:</td>
</tr>
<tr>
<td>CCC element(s) or part of an element:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How are students making sense?</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEP(s) and/or Student Discourse</td>
</tr>
<tr>
<td>SEP element(s) or part of an element and how students are engaging in each element:</td>
</tr>
<tr>
<td>Student discourse (how student discourse is directly supporting engagement in the SEP(s) and/or figuring out the phenomenon):</td>
</tr>
</tbody>
</table>

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### Diagram

- **Planning and Goal Setting**
- **Enacting and Observation**
- **Reflection and Feedback**

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[NSTA Logo]
Sensemaking - Pre-Observation Planning

- POGIL
- LEAP
- Photosynthesis
- Models
- Models & Science Talk
- Text & Media

How do organisms obtain and use the energy they need to live and grow (and compete in the Olympics?)

- Models & Argument
- Investigate
- Sinkers & Floaters

- Matter Energy Flows
- Investigation Practice Models
- Systems Energy

- Phenomena

Information Frame

1 2 3

Sensemaking Frame

[NSPA Logo]
### Sensemaking - Pre-Observation Planning

<table>
<thead>
<tr>
<th>What phenomenon are students trying to explain?</th>
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<tbody>
<tr>
<td>Plants gain mass when exposed to sunlight.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What are students making sense of?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disciplinary core idea element or part of an element:</strong></td>
</tr>
<tr>
<td>The process of photosynthesis converts light energy to chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.</td>
</tr>
<tr>
<td><strong>Crosscutting concept element or part of an element:</strong></td>
</tr>
<tr>
<td>Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy [and] matter flows within systems.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>How are students making sense?</th>
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<tbody>
<tr>
<td><strong>Science and Engineering Practices (SEPs) and/or Student Discourse</strong></td>
</tr>
<tr>
<td><strong>SEP element(s) or part of an element:</strong></td>
</tr>
<tr>
<td>Develop a model to describe unobservable mechanisms.</td>
</tr>
<tr>
<td><strong>Student discourse (intentional sequence of student interactions):</strong></td>
</tr>
<tr>
<td>Work in small groups to share initial models, give and receive feedback, and revise models before sharing revised models with whole class.</td>
</tr>
</tbody>
</table>
Sensemaking - Pre-Observation Planning

Observation Protocol

<table>
<thead>
<tr>
<th>Data collection focus:</th>
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<tbody>
<tr>
<td>Teacher Says</td>
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</tbody>
</table>

Summary of Observations

<table>
<thead>
<tr>
<th>Successes:</th>
<th>Challenges/Next Steps:</th>
</tr>
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</table>
Sensemaking - Observations
### Sensemaking - Observations

Data Collection Focus: Did my “back-pocket” questions push student thinking deeper and help students see their own gaps in their understanding of the process of photosynthesis? Did these questions support students in creating their models to explain the process of photosynthesis?

<table>
<thead>
<tr>
<th>Teacher Says</th>
<th>Students Do/Say</th>
<th>Engaging in Practices/Discourse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
Discipline-Specific Questions

Discipline-specific (“back pocket”) questions about photosynthesis and systems/system models:

• What are the components of your system?
• What are the boundaries of your system?
• What are the inputs? outputs?
• How did you revise your initial model to make it more complete?
• What experience did you have in class that gave either new understanding or new evidence that led to a revision of your model?
Science Practice-Specific Questions

Science practice-specific ("back pocket") questions to support students with developing and using models

- The parts of the system are...

- In this system _______ interacts with _______ to cause _______.

- The model we used to describe the system we are studying was _______ because it _______. (Why do you think your model is the best representation of the system?)
Sensemaking - Observations

Small Group

Share your observations with your group.

• What are similarities and differences?

• How did the pre-observation conversation with the teacher help you decide what to record?

• What are examples of successes you identified (student and/or teacher)?

• What might be a next step for this teacher?

Data Collection Focus:

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</table>
Student Work Analysis Protocol

What were the three-dimensional (3D) learning goals for the students? (Lesson-level performance expectation)

**Develop a model that illustrates the process of photosynthesis to represent input, process, and outputs of energy and matter flow within a system.**

<table>
<thead>
<tr>
<th>Science &amp; Engineering Practice element(s)</th>
<th>Disciplinary Core Ideas element(s)</th>
<th>Crosscutting Concepts element(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a model to describe unobservable mechanisms.</td>
<td>The process of photosynthesis converts light energy to chemical energy by converting carbon dioxide plus water into sugars plus released oxygen.</td>
<td>Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy [and] matter flows within systems.</td>
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### STUDENT WORK ANALYSIS PROTOCOL

<table>
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<th>Teacher:</th>
<th>Date:</th>
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</table>

<table>
<thead>
<tr>
<th>What were the three-dimensional (3D) learning goals for students? (Lesson-level performance expectation)</th>
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</table>

<table>
<thead>
<tr>
<th>Science/Engineering Practice element(s)</th>
<th>Disciplinary Core Idea element(s)</th>
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<tbody>
<tr>
<td></td>
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</table>

Student Work Data

<table>
<thead>
<tr>
<th>Overall: what might be the strengths of the students' reasoning?</th>
<th>How well does the student work address the task/question as it was asked?</th>
<th>What differences are there among the samples? Is there evidence of divergent thinking?</th>
</tr>
</thead>
<tbody>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>What teacher decisions might have led to these results?</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>What is the next step in learning for these students?</th>
</tr>
</thead>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>What is the next step for you learning about your practice?</th>
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</table>
Sensemaking - Observations

Small Group
Share your observations with your group.

• What are similarities and differences?

• How did the pre-observation conversation with the teacher help you decide what to record?

• What are examples of successes you identified (student and/or teacher)?

• What might be a next step for this teacher?
Lesson Reflection Protocol

**LESSON REFLECTION PROTOCOL**

Teacher:  
Coach:  
Date:  

What were the learning goals for students today?

What was our focus for the lesson today?

I noticed… I wonder… What might we learn based on this evidence?

How were students engaged in the SEPs in order to make sense of the phenomena?

How did they use the CCCs to make sense of the phenomena?

How did they relate the DCI to the phenomena?

Action Steps:

- What are examples of successes you identified (student and/or teacher)?
- What might be a next step for this teacher?
NSTA Coaching Cycle

Planning and Goal Setting

Enacting and Observation

Reflection and Feedback
Be an NSTA Conference Reviewer!

NATIONAL CONFERENCE ON SCIENCE EDUCATION

NEW ORLEANS 2024

NOVEMBER 6-9
Kate Soriano
NSTA Standards Implementation Specialist
ksoriano@nsta.org
Together, we are NSTA.

Please review this session.